

Summary
PRIER – A Tool for Planning Multi-Pollutant Control Strategies
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One of the critical goals of the Power Reliability Improvement and Emissions Reduction (PRIER) program for coal-fired power plants is to identify and validate technologies that will reduce emissions by improving a plant's overall performance. The PRIER program has identified several performance improvement technologies that allow a plant to produce the same amount of power with less coal. Reduced coal rates translate into lower emissions and environmental impacts.

Improving coal-fired plant performance involves the whole plant, not just the boiler. The PRIER performance improvement technologies in this paper are real and do not violate any laws of thermodynamics or the Rankine cycle.

Ten coal-fired plants have undergone a PRIER analysis. These plants range in size (e.g., less than 500 MW to greater than 1000 MW) and age (e.g., over 50 years to less than 20 years old). Initial PRIER analyses showed that all of these plants have a significant potential to reduce emissions through improved plant performance. Detailed PRIER analyses were performed at two of those plants to validate the results of the initial analyses. These detailed analyses showed that these two plants could reduce emissions by 10.2 % and 5.9 %, respectively. These reductions were in the middle portion of the range of potential emissions reductions derived from the initial PRIER analyses.

Emissions reductions result from implementing PRIER performance improvement technologies. Performance improvement technologies used in the PRIER program are DCS tuning, next generation intelligent sootblowing (NGISB), combustion optimization, global unit optimization, load dispatch optimization, turbine upgrades, condenser maintenance, and reduced intake water temperature. When other performance improvement technologies are identified they will be incorporated into the PRIER program.

The results of the PRIER program have shown that:

PRIER Technologies are an Effective Multi-Pollutant Control Planning Tool for Coal Fired Power Plants – PRIER technologies that improve a plant's overall performance (e.g., produce the same amount of power with less coal) will result in a corresponding reduction in pollutants emitted to the environment. Many coal plants can expect a 6 to 13 percent reduction in total plant pollutant emissions. Additional

reductions in other pollutants (e.g., NO_x) will also result in applying PRIER technologies, such as combustion optimization and NGISB. Field studies are currently underway to validate the emissions reduction potential for selected PRIER technologies.

PRIER Technologies will Result in additional Multi-Pollutant Reductions –

Reducing coal feed to a power plant will also reduce the multi-pollutant emissions from other operations, such as coal mining, coal preparation, coal transportation, ash transport, and ash disposal. A 6 to 13 percent reduction in the pollutant emissions for these operations can also be expected.

PRIER Technologies will Result in Greenhouse Gases Reduction – Reducing coal feed to the power plant will reduce CO₂ emissions from the power plant, coal mining, coal preparation, coal transportation, ash transportation, and ash disposal.

PRIER Technologies will Reduce Operating Costs – Reducing coal feed rate will also reduce plant operating costs. For a large multi-unit plants or systems, this could mean annual operating cost savings of several millions of dollars.

PRIER Technologies will Reduce Resource Usage – Improving plant performance will also reduce the amount of other resources used. For example, water usage will be reduced by improved performance.

PRIER Technologies will Improve Reliability – Several PRIER technologies improve a systems reliability and availability. For example, NGISB can reduce maximum metal temperatures, reduce thermal cycling, and reduce water wall exposure to steam. This will result in increased system reliability and availability.

The ultimate success of the PRIER Program will depend on the ability to capture, validate, and transfer knowledge of PRIER technologies and implementation strategies to industry and other interested NETL Stakeholders. The PRIER Compendia will be designed to accomplish this in an easy-to-use and cost-effective manner. It is important that DOE/NETL maintain a key role in the compendia to ensure that the knowledge captured and transferred is valid, objective, and up to date.